

# **METHOD FOR GROWING GROUP-III NITRIDE SEMICONDUCTOR HETEROSTRUCTURE ON SILICON SUBSTRATE**

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## **ABSTRACT OF THE INVENTION**

The present invention provides a method for growing group-III nitride semiconductor heteroepitaxial structures on a silicon (111) substrate by using a coincidently matched multiple-layer buffer that can be grown on the Si(111) substrate. The coincidently matched multiple-layer buffer comprises a single-crystal silicon nitride ( $Si_3N_4$ ) layer that is formed in a controlled manner by introducing reactive nitrogen plasma or ammonia to the Si(111) substrate at a suitably high temperature. Then, an AlN buffer layer or other group-III nitride buffer layer is grown epitaxially on the single-crystal silicon nitride layer. Thereafter, the GaN epitaxial layer or group-III semiconductor heteroepitaxial structure can be grown on the coincidently matched multiple-layer buffer.

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